

(12) UK Patent Application (19) GB (11) 2 345 069 (13) A

(43) Date of A Publication 28.06.2000

(21) Application No 9828042.3

(22) Date of Filing 18.12.1998

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(51) INT CL⁷
E04B 1/343 // E04H 9/10

(52) UK CL (Edition R)
**E1D DF115 DF194 DGS2 D189 D193 D2019 D401 D402
D503**

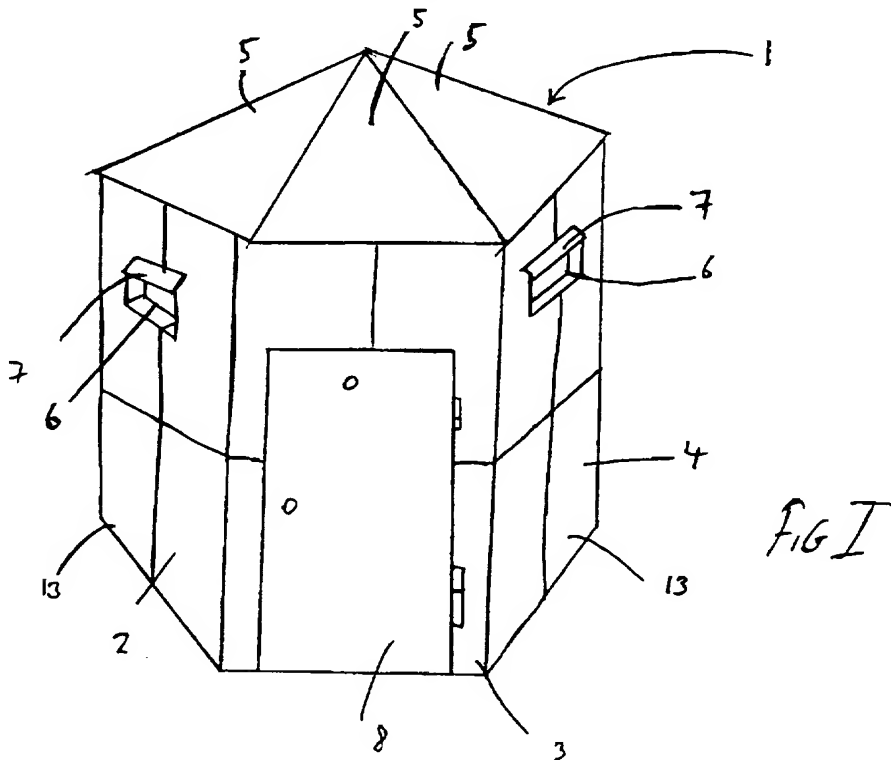
(56) Documents Cited
**GB 2296022 A GB 2286412 A GB 2277334 A
GB 2275944 A EP 0506502 A1 US 3820294 A**

(58) Field of Search
UK CL (Edition R) **E1D DF115 DF194**
INT CL⁷ **E04B 1/343 , E04H 9/04 9/10**
Online: EPODOC, WPI, JAPIO

(54) Abstract Title
Armoured modular structure assembled from kit of parts

(57) The modular structure comprises a plurality of wall parts (2, 3, 4,) and roof parts (5) connected together by quick release devices, where each wall part comprises four individual wall plates (13) made up of inner and outer skins spaced a suitable distance apart. Each part is made from an armoured material, preferably steel.

The structure may also comprise a door (8) and ports (6) with closable shutters (7). The kit of parts is easily transportable and readily assembled into a number of different shapes.



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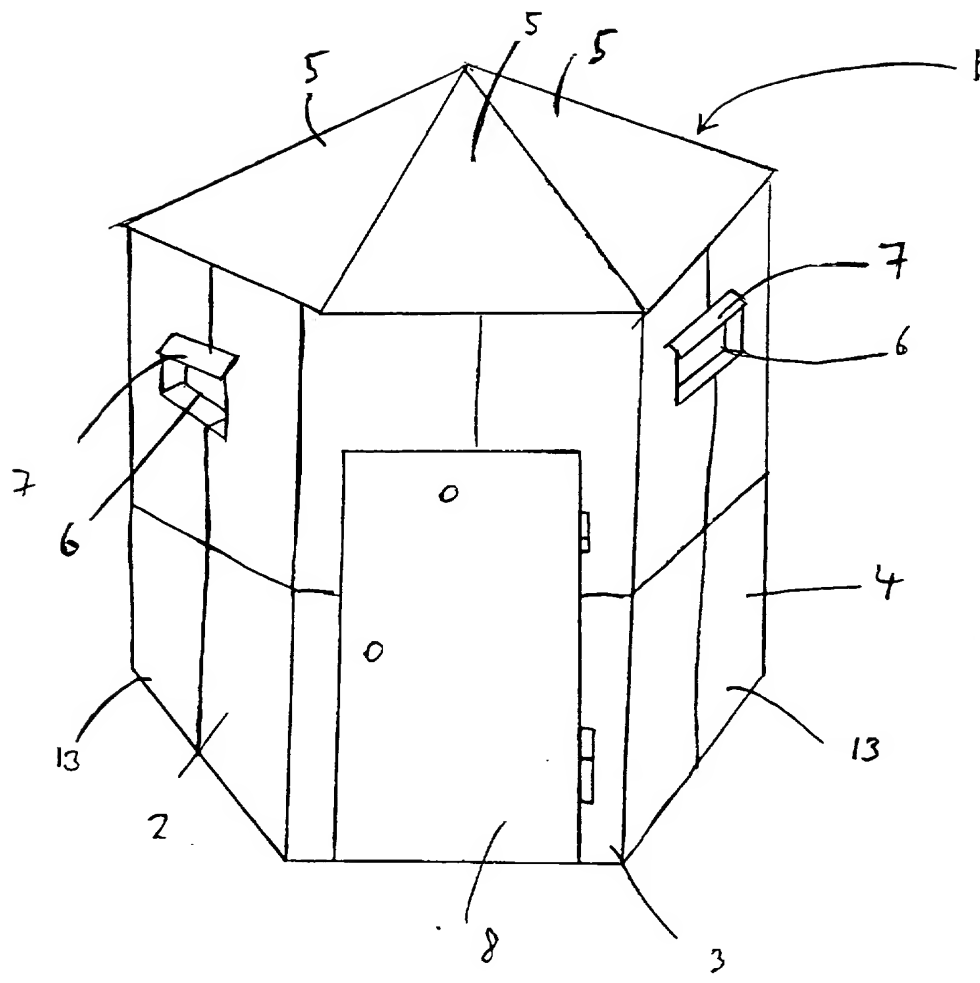


FIG I

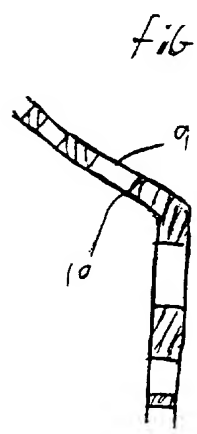
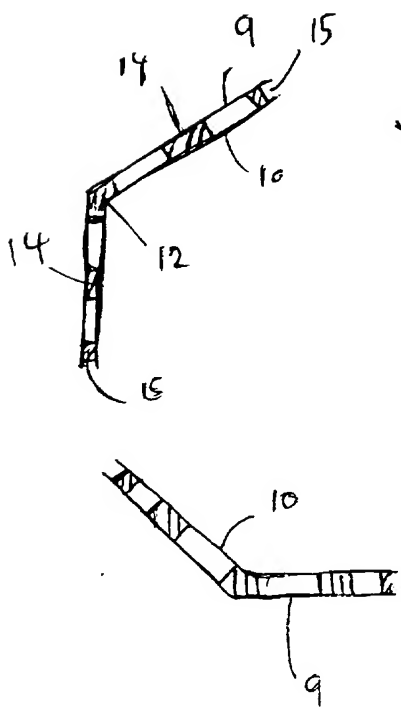


fig. 3

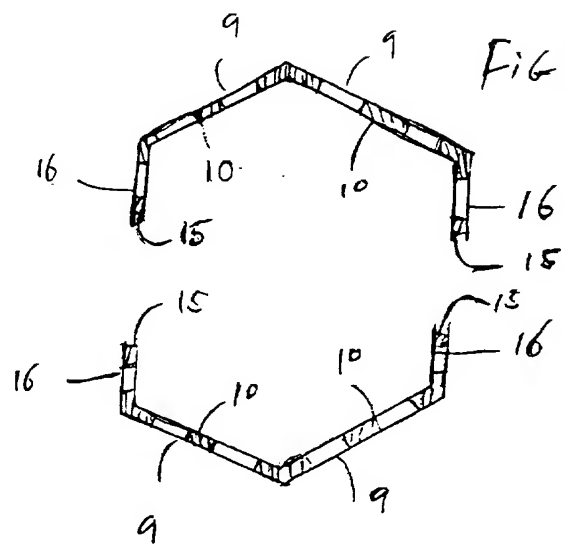


FIG 4

FIG. 2

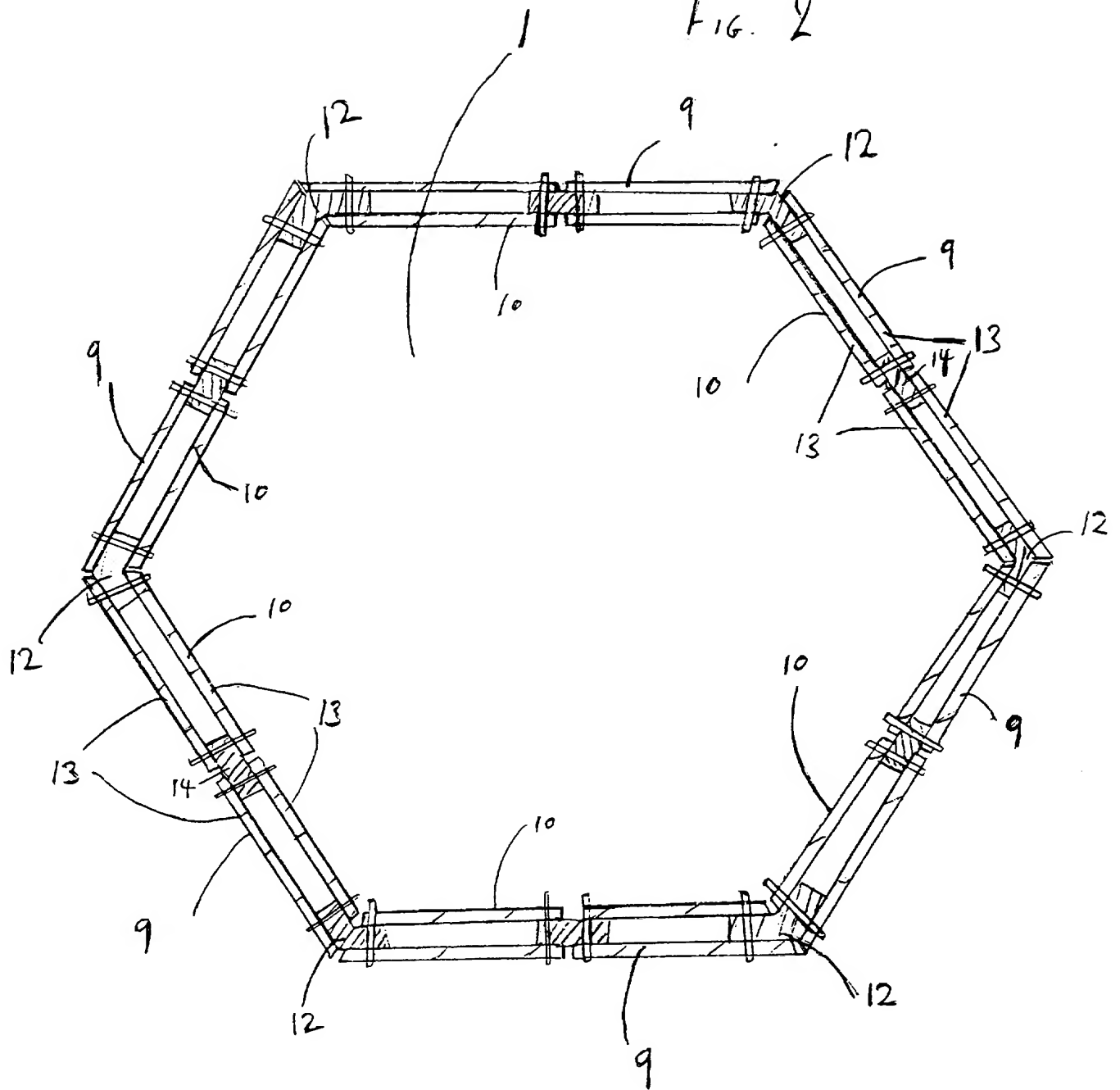


Fig 5

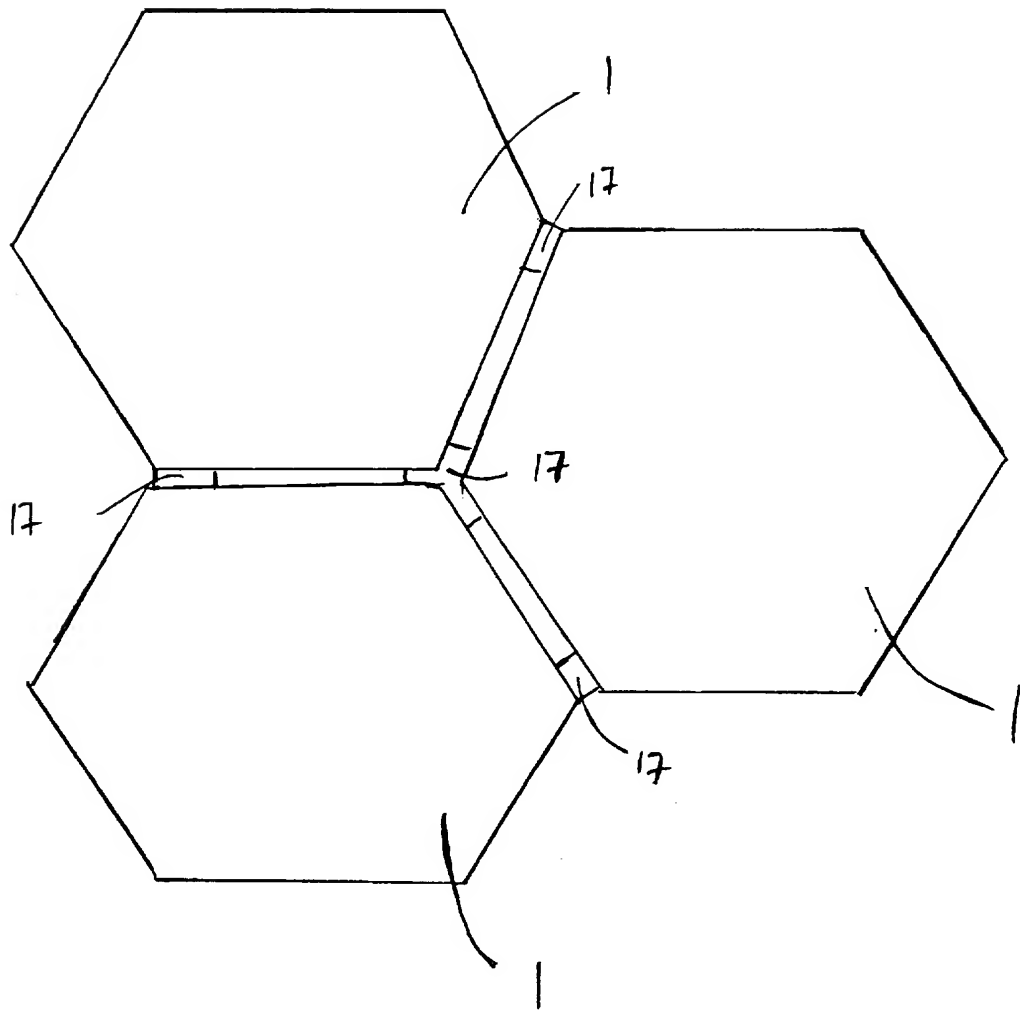
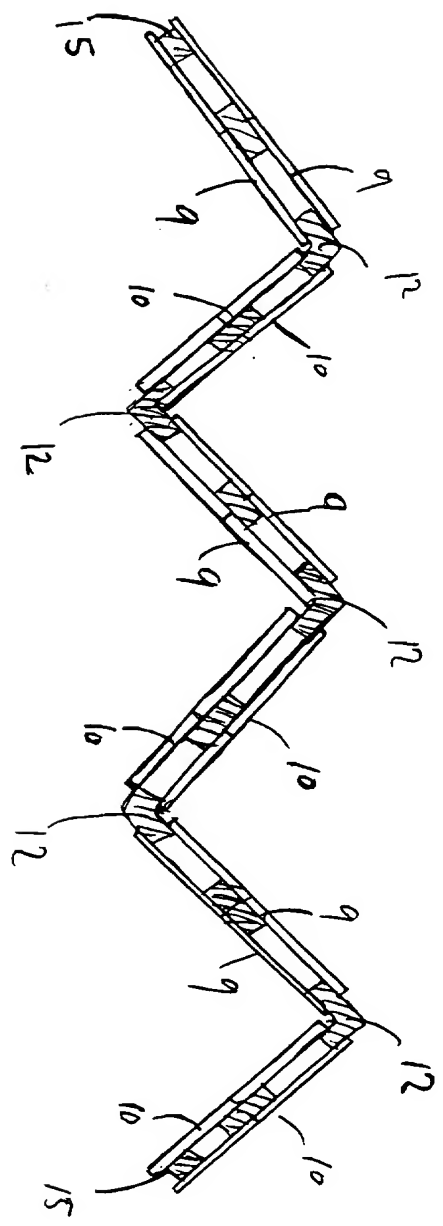


Fig 6



Armoured Structure

The present invention relates to an armoured structure.

Armoured structures such as block houses, sangars, forts and the like have been constructed for many years. They find application in military use, police use, and to a certain extent, in hazardous industrial areas such as testing stations, fuel stores etc.

They are typically armoured against small arms fire, explosions and maybe against heavier weapons such as artillery or rockets.

They must be large enough to be occupied by people, light equipment and stores and may be big enough for very large numbers of people and large equipment. The armour may be provided by steel reinforcement or any suitable material.

Conventional armoured structures may be constructed of any suitable building material such as concrete, sand bags, earth or any other material. They are laborious to construct and sometimes laborious to maintain and repair. They cannot be adapted without substantial effort.

The present invention provides a modular armoured structure.

The present invention can provide a structure, armoured against small arms fire or heavier weapons, which can be largely constructed away from its place of use. It can be repositioned at will and re-used when necessary.

By "modular" it is meant that the structure is constructed as a complete or partially complete construction or module which can be transported, assembled or in kit form, to its eventual site for installation and, if necessary, assembly.

The present invention allows the normal problems of difficulties of transporting building materials, time to construct the armoured structure, adaptability of armoured structures once built etc. to be overcome.

The modular structure can be designed for use as a self contained unit, having all the necessary features for operation. It may additionally or alternatively be usable in

connection with other modular armoured structures of the same design, or different designs, to provide a network of structures or to provide a larger combined structure.

The structure is preferably armoured against small arms fire, such as from full calibre rifles, assault rifles, machine guns, submachine guns, heavy machine guns, rockets or shell and grenade splinters.

The structure should be large enough to house at least one person, preferably more than one person, together with equipment such as communications equipment, observation equipment, weapons, supplies (for example food and medical supplies). Preferably, the structure comprises an internal space for occupation of at least 1.5 metres in height, preferably 2.0 metres in height, and a floor area of at least 1 square metre preferably at least 2 square metres, preferably more.

The structure may be of any suitable shape, for example it may have planar side walls, curved side walls, sloped side walls, vertical side walls, or whatever is suitable. It may have a roof, for example a flat, domed or pitched roof. It may have a base, to which the walls are attached or attachable.

The structure may have structural members such as a framework, beams or the like, to which walls are attached. The walls may be of armoured material or they may be designed to mount armoured shields. The walls may be of sufficient rigidity to make an additional framework unnecessary.

At least one entrance should be provided.

Preferably, ports are provided for observation and/or use of weapons by personnel inside the structure. There may be means for closing the ports. For example, armoured shields may be provided for closing the ports.

The roof may extend over the whole of the structure or over at least part of the structure.

The structure may comprise a single internal space or a plurality of internal spaces, preferably connected to one another. For example, there may be an open topped observation post and a roofed, enclosed part.

The ports will be of a suitable size, as is known to the person skilled in the art, to provide a good balance of view, field of fire, and protection. Additional means, such

as cameras, episcopes, vision blocks etc. may be provided to facilitate observation. Mounting means may be provided for weapons for use from within the structure.

Lifting points may be provided on the complete structure, whereby lifting means such as a helicopter, crane or fork lift truck may be used to raise the structure for transport and relocation. Lifting means may be provided on components of the structure to allow it to be man-transported, as will be discussed further below.

The armoured parts of the structure may comprise any suitable material, as will be known to the person skilled in the art. For example, metal, such as aluminium or steel may be used. Composite materials, such as Kevlar (trade mark), nylon, ceramic reinforced steel laminate may be used.

Preferably, the structure is protected on all sides by armoured steel. Preferably, spaced armour comprising at least two layers of armour separated by a predetermined space is used. For example, the armour may comprise two sheets of armoured steel, for example of thickness in excess of 6 mm, separated by a space.

In addition to being armoured, the walls may be treated with paint or other coating materials. For example, insulation may be provided to provide insulation against heat or cold. Sealant may be provided to prevent ingress of water. Protection may be provided against corrosion. Camouflage may be applied.

The structure may be in the form of a kit of parts, for example wall parts and port parts. The respective parts may comprise wall sections having means for fixing to one another. Fixing means, such as bolts or quick release fittings, which will be known to the person skilled in the art, may be used to join wall sections together. Joints between wall sections may be sealed against bullets or rain by overlapping parts or by being finished to a close fit, as will be known to the person skilled in the art.

Where the structure is in the form of a kit of parts, the individual wall parts may themselves comprise a plurality of wall plates joinable to one another.

The sections of the kit of parts may be of such a weight that they can be easily transported, preferably in a vehicle, but also preferably by personnel. Preferably, the wall sections are of weight less than 30 kgs, preferably less than 25 kgs, more preferably less than 20 kgs. Carrying means may be provided to allow the sections to be picked up easily.

The kit of parts has a number of advantages. In the first place, it can be transported relatively easily using personnel or light vehicles. Secondly, if any given part of the structure, after assembly, is damaged, that part can be removed and replaced by a corresponding spare part. Further, there may be means to allow the wall sections of the kit of parts to be assembled into different shaped structures, whereby great flexibility of design can be obtained.

The invention will be further described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of the structure according to the present invention;

Figure 2 is a horizontal cross section through the structure of Figure 1; and

Figures 3-6 are schematic representations of different ways to assemble the kit of parts.

The structure of Figure 1 is a block house of hexagonal cross-section, having six armoured vertical walls, of which three are visible (2, 3, 4). The structure has an armoured roof consisting of six pitched triangular sections 5 (of which three are visible).

Walls, e.g. 2, and 4 have ports 6. More ports may be provided if necessary. The ports 6 are provided with closable shutters 7, also armoured.

A door 8 is provided in wall 3.

Figure 2 shows a cross-section through the structure 1. It comprises a plurality of outer wall parts of armoured steel (9) and a plurality of corresponding inner wall parts of armoured steel (10). Each inner wall part 10 is parallel to its respective outer wall part 9. The inner and outer wall parts 9, 10, each comprise four individual wall plates, e.g. 13. Respective inner and outer wall parts 9 and 10 are spaced by a suitable distance by a spacer part 12 which also acts as a connector at the edges of the wall parts 9, 10, for connecting them to respective adjacent inner or outer wall parts. Fixing means, in this case quick release devices 11, pass through the outer wall 9, spacer part 12 and inner part 10 to connect them together. The person skilled in the art will be able to provide suitable quick release devices. Further connecting means 14 comprising quick release devices are provided for joining individual wall plates 13 together. The

structure may comprise a floor (not shown) to which the wall parts 9,10 are connected by structures known to the person skilled in the art.

The roof parts 5 comprise inner armoured wall parts and outer armoured wall parts in the same manner as the side walls 2, 3, 4 etc. The roof parts are connected to one another and to the wall parts by fixing means corresponding to those shown in Figure 2 and known to the person skilled in the art.

The door, whose position is not shown in Figure II, is constructed of spaced inner and outer armoured wall parts in the same manner as the walls 2, 3, 4 and is provided with hinges, locks, handles in a manner known to the person skilled in the art.

The structure shown in Figures 1 and 2 may be broken down into a plurality of parts. The parts comprise six wall sections, each wall section comprising four inner plates and four outer plates 13, a suitable number of connecting means 12 and bolts 11, six separate outer roof parts 5, six separate inner roof parts, and fixing means for the roof parts etc.

In use, the system may be assembled in a short time, for example approximately two hours.

Figures 3 and 4 show how an armoured structure according to Figure 2 can be assembled in a different form, or can be partially disassembled.

Figure 3 shows how the inner wall sections 10 and outer wall sections 9 can be assembled to define three separate shield sections. The connecting means 12 and 14 are shown schematically. Reinforcements 15 may be provided in the kit of parts for joining the inner and outer wall sections 9 and 10 at their extremities when they have been partially assembled in the manner shown in Figure 3. Figure 4 shows another way in which the kit of parts can be assembled. In this case, two shield sections have been provided, with half-wall parts defined by just four wall plates in each case. Again, reinforcement means may be provided as shown.

Figure 5 shows how a plurality of armoured structures 1 can be assembled into a larger structure by the use of additional connectors 17, shown schematically in Figure 5.

Figure 6 shows how the structure of Figure 2 may be reassembled to define a parapet of considerable length. In this case, inner and outer wall sections 9, 10 respectively are reassembled using the connecting means 12 to form a zigzag armoured

parapet. Again, reinforcements 15 may be provided between respective wall parts at the ends.

The present invention has been described above by way of example only. Modifications can be made within the invention. The present invention further comprises any modification or generalisation of any features described herein or any combination of any such features or such modifications or generalisations.

Claims:

1. A modular armoured structure.
2. A modular armoured structure according to claim 1, comprising a kit of parts.
3. A modular armoured structure according to claim 2, wherein the parts, or sets of the parts, are man-portable.
4. A modular armoured structure according to claim 1, 2 or 3, wherein the armour comprises armoured steel.
5. A modular armoured structure according to claim 4, wherein the armour comprises at least two armoured steel walls spaced from one another.
6. A modular armoured structure according to claim 2 or 3, wherein the kit of parts is re-assembleable into a plurality of different shapes.



Application No: GB 9828042.3
Claims searched: 1-6

Examiner: Joanne Pullen
Date of search: 18 April 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): E1D DF115, DF194.

Int Cl (Ed.7): E04B E04H

Other: Online: EPODOC, WPI, JAPIO. EPODOC, WPI, JAPIO.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2296022 A (J H TURKINTON & SONS LTD) Page 2 lines 1-3, page 3 lines 3 and 4	1, 2 & 4-6
X	GB 2286412 A (KARL CONSTRUCTION LTD)	1 & 2
X	GB 2277334 A (HENRY BROTHERS LTD) Page 3 lines 29-36.	1-3
X	GB 2275944 A (MODEQUEST PROJECTS LTD) Page 1 line 22-page 2 line 16.	1-3
X	EP 0506502 A1 (GIAT INDUSTRIES) Abstract and figures	1-5
X	US 3820294 A (C. E. PARKER) Column 1 lines 38-42 and 49-52 and figures.	1-6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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